

# Radiochemical Study of Nuclear Spallation and Fission at Intermediate Energies

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# 1996 Fiscal Year Final Research Report Summary

## Radiochemical Study of Nuclear Spallation and Fission at Intermediate Energies

Research Project

### Project/Area Number

07304077

### Research Category

Grant-in-Aid for Scientific Research (A)

### Allocation Type

Single-year Grants

### Section

総合

### Research Field

Inorganic chemistry

### Research Institution

Kanazawa University

### Principal Investigator

**SAKAMOTO Koh** Kanazawa University, Faculty of Science, Department of Chemistry ; Professor, 理学部, 教授 (10013377)

### Co-Investigator(Kenkyū-buntansha)

SHIBATA Seiichi Kyoto University, Research Reactor Institute, Professor, 原子炉実験所, 教授 (80110708)

KUDO Hisaaki University of Niigata, Faculty of Science, Assoc.Professor, 理学部, 助教授 (30170004)

SEKINE Tutomu University of Tohoku, Faculty of Science, Assoc.Professor, 理学部, 助教授 (20154651)

MASUMOTO Kazuyoshi Tokyo University, Institute for Nuclear Study, Assoc.Professor, 原子核研究所, 助教授 (60124624)

FUJIWARA Ichiro Otemon Gakuin University, Professor, 経済学部, 教授 (60027125)

### Project Period (FY)

1995 – 1996

### Keywords

## Research Abstract

Radiochemical studies of various aspects of nuclear reactions such as spallation, fission and fragmentation have been performed at low to high energies by using photons, neutrons, protons, and heavy ions from available accelerators in Japan, and discussed together for reaction mechanism and their possible applications.

Photopion reactions photospallation, photofission and photofragmentation of 22 targets ranging from  $^{27}\text{Al}$  to  $^{201}\text{Bi}$  at 60-1000 MeV were extensively studied by Sakamoto, Fujiwara and Shibata. Recoil measurements of Cu-spallation and Au-fission were included. Masumoto and Ohtsuki measured the depth and angular profiles of spallation products in a 250 cm concrete shields for Tohoku Univ.e-linac. This accelerator was used by Sakamoto group and Mitsugashira who reported studies of photofission of  $^{237}\text{Np}$  and production of  $^{242}\text{Cm}$  and  $^{238}\text{Pu}$  in a high-flux reactor JMTR.Recoil range measurement was performed by Sekine, in which a new thin foil method was developed. He al so studied recoil synthesis of labelled compounds by (n, g) and (g, n) reactions. Heavy ion-induced spallation upto GeV energies was extensively studied by Shinohara who also continued an important study of pi-mesic atom chemistry at KEK PS.Momentum transfer in nuclear processes is a very important information, and investigated in heavy-ion-induced reactions by Shinohara and also in proton-induced fission of  $^{238}\text{U}$  and  $^{232}\text{Th}$  by Kudo. Neutron- and Proton- induced reactions producing light nuclei like  $^7_{10}\text{Be}$  at several tens of MeV are of vital importance in many applications, and several results of excitation functions were reported by Imamura and Shibata. An extremely sensitive measurement of long-lived radionuclides has been established by Kobayashi, Nagai and Imamura, and successfully applied to some of the above-mentioned reaction studies. Combined discussions were performed by exchanging information obtained during the course of the present project, and our prospects for further developments in this field have been exploited.▲ Less

## Research Products (12 results)

		All	Other
		All	Publications (12 results)
[Publications]	K.SAKAMOTO, et al.,: "Neutron and Photon Activation Analysis of Twenty Four GSJ and Six KIER Rock Reference Samples" J.Radioanalytical and Nuclear Chemistry,Articles. 215(1). 69-76 (1997)		▼
[Publications]	K.MASUMOTO, et al.,: "Chracteristics of Radiation Fields of a High-Power Electron Linear Accelerator and Radiation Safety of the Working Environment" Proceedings of the 21st Linear Accelerator Meeting in Japan (Sept.30-Oct.2,1996,Tokyo,Japan). 2a-11. 135-137 (1996)		▼
[Publications]	T.OHTSUKI, et al.: "Binary Scission Configurations in Proton-Induced Fission of $^{238}\text{U}$ .of $^{238}\text{U}$ " Phys.Rev.C,. (印刷中). (1997)		▼
[Publications]	T.MUROYAMA, A.SHINOHARA, et al.: "Intensity Patterns of Pionic X Rays Emitted from some Organic Compounds." Radiochim.Acta,. (印刷中). (1997)		▼
[Publications]	H.KUDO, M.MARUYAMA, et.al: "Most Probable Charge of Fission Products in 24 MeV Proton Induced Fission of $^{238}\text{U}$ " Phys.Rev.C,. (印刷中). (1997)		▼
[Publications]	M.IMAMURA, T.SHIBATA, et al.,: "Measurements of Proton-Induced Production Cross Sections for $^{36}\text{Cl}$ from Ca and K." Nucl.Instr.and Meth.in Phys.Res.,B. (印刷中). (1997)		▼
[Publications]	K.Sakamoto, N.Aota, Y.Miyamoto, S.Kosanda, Y.Oura, T.Okui, M.Igarashi and T.Nakanishi: "Neutron and Photon Activation Analysis of Twenty for GSJ and Six KIER Rock Reference Samples." J.Radioanal.Nucl.Chem., Articles. 215 (1). 69-76 (1997)		▼
[Publications]	K.Masumoto, T.Ohtsuki, J.Kasagi, S.Urasawa, A.Kurihara, S.Takahashi and Y.Shibasaki: "Characteristics of Radiation Fields of a High-Power Electron Linear Accelerator and Radiation Safety of the Working Environment." Proceedings of the 21st Linear Accelerator Meeting in Japan, (Sept.30-Oct.2,1996, Tokyo, Japan). 2a-11. 135-137 (1996)		▼
[Publications]	T.Ohtsuki, Y.Nagame, I.Nishinaka, K.Tsukada, H.Ikezoe, M.Tanikawa, Y.L.Zhao, K.Sueki and H.Nakahara: "Binary Scission Configurations in Proton-Induced Fission of $^{238}\text{U}$ ." Phys.Rev.C. (in press). (1997)		▼
[Publications]	T.Muroyama, A.Shinohara, M.Furukawa, T.Miura, T.Saito and A.Yokoyama: "Intensity Patterns of Pionic X Rays Emitted from some Organic Compounds." Radiochim.Acta.(in press). (1997)		▼
[Publications]	H.Kudo, M.Maruyama, M.Tanikawa, T.Shinozuka and M.Fujioka: "Most Probable Charge of Fission Products in 24 MeV Proton Induced Fission of $^{238}\text{U}$ ." Phys.Rev.C. (in press). (1997)		▼

[Publications] M.Imamura, K.Nishiizumi, M.W.Caffee and S.Shibata: "Measurements of Proton-Induced Production Cross Sections for  $^{36}\text{Cl}$  from Ca and K." Nucl.Instr.and Meth.in Phys.Res.B. (in press). (1997)



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